

## ABSTRACT

5 In at least one embodiment, the apparatus of the present invention is a heat exchanger which includes a core having a thermally variable size and a support structure. To minimize, or eliminate, differential thermal expansion, the support structure is connected to the core and thermally deforms to accommodate variations in the size of the core. The support structure employs a thermally deformable member which can be a tie rod with a planar center section. 10 In other embodiments, the support structure includes a first strongback, a second strongback, and at least one variable thickness tie rod mounted between the strongbacks. The variable thickness tie rod can be a broadened end tie rod having an end or ends which are thicker (wider) than a center section. The present invention also includes methods of fabrication. One embodiment includes the steps of obtaining a tie rod having a substantially uniform thickness and forging the tie rod to define a planar center section. Another embodiment 15 includes obtaining a tie rod of uniform thickness, forging a first end of the tie rod to broaden the thickness of the first end, and applying threads to the first end of the tie rod.